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Education of coaches on proper soccer shoe fit

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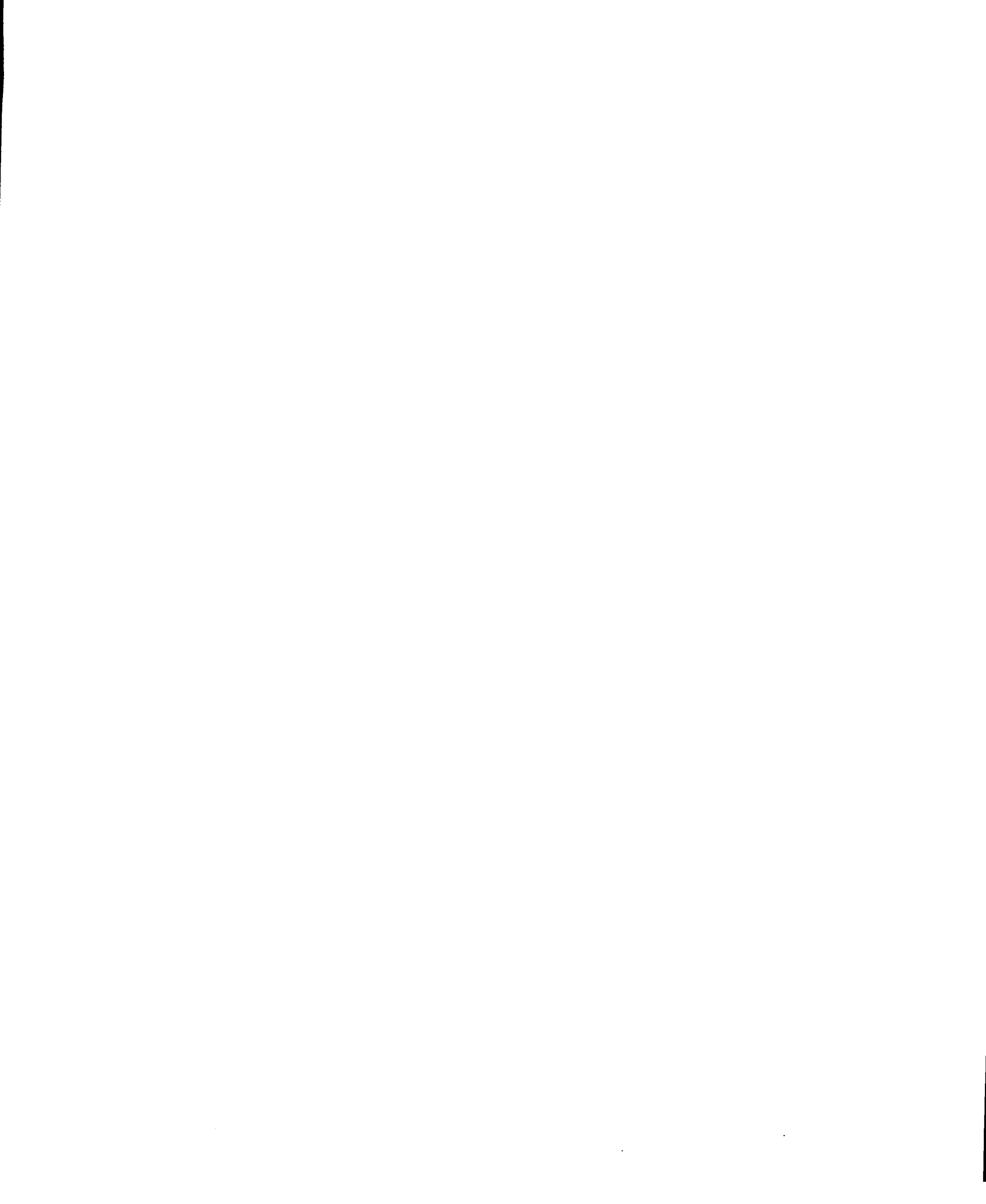
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EDUCATION OF COACHES ON PROPER SOCCER SHOE FIT

A Project

Presented to

The Faculty of the Department of Human Performance

San Jose State University

In Partial Fulfillment

Of the Requirements for the Degree

Master of Arts

By

Shyla H. Penn

August, 2001

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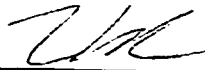
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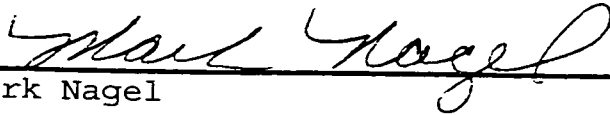
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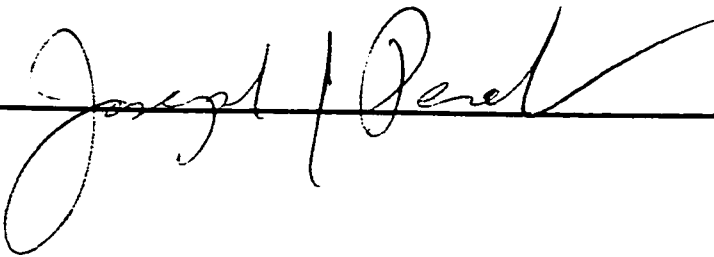


Mark Nagel



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ABSTRACT

EDUCATION OF COACHES ON PROPER SOCCER SHOE FIT

by Shyla Penn

Soccer shoes have been an integral part of play for many decades and yet athletes continue fitting soccer shoes improperly. Improperly fit soccer shoes can cause injuries that result in practice and game time-loss that could be easily prevented.

Athletes have different foot shapes and therefore must purchase shoes that are custom fit. Injuries from fractures to patellar femoral syndrome can be sustained due to improperly fit shoes. Youth and high school soccer coaches are the targeted population in an attempt to prevent time-loss injuries. Soccer coaches can significantly influence athletes, therefore information will most likely transfer from coach to athletes as opposed to other personnel involved with soccer teams. Education of coaches regarding how to properly fit a soccer shoe will help to educate athletes and reduce injury rates. Information on proper soccer shoe fit was compiled into an article and submitted for publication to Soccer Journal.

ACKNOWLEDGMENTS

I would like to thank the people that have made this work possible. First I would like to thank my committee, Leamor, Mark and Carrie, for their time and energy; it was much appreciated. I would also like to thank my family for always supporting me. Last but not least thanks to Rick for being the light at the end of my tunnel.

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EDUCATION OF COACHES ON PROPER SOCCER SHOE FIT

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Time-loss and career ending injuries can occur from improperly fit soccer shoes, however they may be prevented with simple shoe wear corrections. Soccer players are known to wear shoes that are too small for their feet in order to "feel" the ball better. This belief can lead to permanent foot/ankle injury. The concept of wearing soccer shoes one size too small is common throughout the United States and has now become tradition in the soccer community. Often tradition is mistaken as knowledge, perpetuating a potentially injurious practice. Proper shoe fit does not hinder "touch on the ball", and decreases potential injuries, which can eliminate a player for an entire season or permanently.

Injuries, from ankle and foot sprains to blisters can often be prevented with proper soccer shoe fit (see Table 1). A soccer shoe with a narrow heel will roll easier than a wider base, causing ankle sprains, which can keep an athlete out of participation for four to six weeks depending on the severity. Osteochondral lesions, bruising of the bone of the big toe, can keep a player out of participation for an entire season, and may be caused by a soccer shoe that is too short and soft in the toe box. Flexibility in the ball of the shoe, not in the arch, is

important to help prevent stress fractures, plantar fasciitis, and foot sprains. All these injuries have the potential to be season ending.

Improperly fitting shoes with a small toe box can potentially cause blisters, ingrown toenails (see Figure A), jammed toes, bruising of the bone, black toe and hammertoes (see Figure C & D). A shoe that is too short or has cleats directly under a joint may damage the epiphyseal plate in adolescents, stunting toe growth. Bunions (see Figure B), stress fractures, corns, and blisters may be caused by a soccer shoe that is too narrow. Ankle, foot, and toe injuries may be prevented by remembering a few simple rules for properly fitting a soccer shoe. One should start by determining arch type.

Arch Types

Each athlete's foot can be categorized into three general foot types, high arch, medium arch, and low arch (see Figure F). A high arch does not touch the floor when standing, a medium arch is just above the ground, and a low arch touches the ground. Each brand of soccer shoe has different shoe molds, fitting only one of the general foot types. Knowing which shoe brand mold matches the athlete's foot type is important to help prevent injury. Soccer shoes

should be purchased based on proper fit, not because the brand name or style. This may be contrary to purchasing one brand for an entire team. Table 3 outlines fitting soccer shoe brands to foot types, which is necessary in choosing an appropriate shoe.

Determining Arch Type

To determine arch type, wet the foot and make a print on a dark surface. If the line connecting the heel and the ball of the foot is thin it is a high arch. If the line between the ball of the foot and the heel is very thick then it is a low arch. Medium arched feet have a moderate size line between the heel and ball of the foot. Once the arch type is determined there are several steps in choosing the appropriate soccer shoe.

Fitting a Soccer Shoe

Make sure the shoe is the correct size. Foot's length and width should be measured each time new shoes are purchased. The shoe should end a thumb's width from the big toe. The toe area should have enough room for all five toes to rest comfortably on the sole of the shoe.

The shoe should bend where the foot naturally bends, at the ball of the foot. The sole of the shoe should be

rigid enough that pushing it down with two fingers is impossible, but achievable with the palm of the hand.

Twisting the shoe length-wise will test the flexibility of the longitudinal arch. If it twists easily then it is too flexible. If it twists minimally then it is the right flexibility. If it does not twist at all then it is too stiff. In addition, the heel should be stable in order to keep the ankle from rolling and spraining. Test the heel by squeezing the sides of the heels together to determine if it collapses. The heel counter should be one, to one and a half inches high to provide enough support and stop the shoe from slipping off in the middle of a step.

The tongue should be well padded to protect blood vessels and nerves that run along the top of the foot. The tongue should be layered and not simply leather. The ankle collar needs $\frac{1}{4}$ inch below the ankle bones and achilles tendon.

The insole of the shoe should be padded so the cleats are not felt through the insole. Cleats should not be placed under the big toe joint in order to help prevent osteochondral lesions and damage to epiphyseal plates. Regulation cleat diameter for youth soccer is a minimum diameter of $\frac{1}{2}$ of an inch for screw-ins and $\frac{3}{8}$ of an inch

for molded cleats to prevent sharp cleats that have the potential to cause injury.

To prevent slipping, short cleats should be worn when the ground is hard and dry or the grass is short. A long cleat should be worn in order to grip the ground and prevent slipping when the grass is long or the field is muddy. A good test to determine appropriate cleat length is to shuffle the feet on field, if they slip wear a longer cleat, if they catch wear a shorter cleat.

Quick Tips

Three suggestions to make a shoe fit better are: 1) Soak the shoe in warm water and wear until dry; the leather will form to the individual's foot, creating a custom, comfortable fit, 2) lace the shoe loosely for warm-up and re-tie the laces tightly before practices or games. This allows the foot to swell during the warm-up thus reducing the likelihood that the laces will cut-off circulation to the foot, 3) wear practice or game socks while trying on new shoes to make conditions identical to on-the-field game conditions.

Here are five quick tips to take to the shoe store:

- Measure foot width and length each fitting.

- All toes should be flat on the sole of the shoe.
- Match the mold of shoe to the athlete's foot and arch type.
- The arch must be the correct height.
- The shoe should be flexible at the ball of the foot.

Choosing the right soccer shoe helps prevent many time-loss and permanent injuries. Tips for purchasing soccer shoes should aid coaches and athletes in decreasing and preventing potential injuries allowing athletes to participate to their full capacity.

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<http://www.foottalk.com/ingropic.htm> Viewed October 15, 2000 (picture of ingrown toenail)

<http://www.bodysync.net/bunions.htm> Viewed October 15, 2000 (picture of Bunions)

http://www.foothealthnetwork.com/html/hammer_toe.html Viewed October 15, 2000 (picture of hammer toes)

<http://www.dr4feet.com/hammertoes.html> Viewed October 15, 2000 (picture of hammer toes and corns)

<http://www.doctorfoot.com/diagrams.html> Viewed October 15, 2000 (picture of arch types)

<http://www.runnersworld.com/shoes/insole.html> Viewed October 15, 2000 (picture of insoles)

<http://www.livesoccer.com/um-9523.html> Viewed October 15, 2000 (picture of shoe)

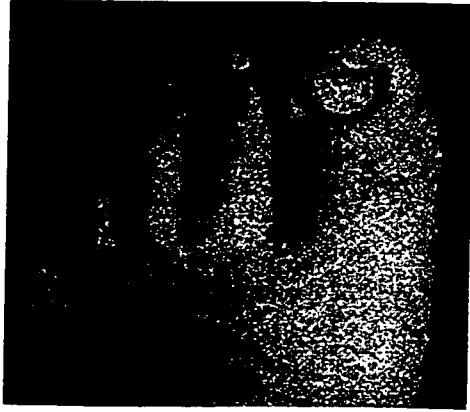


Figure A. Ingrown toenail
(<http://www.foottalk.com/ingropic.htm>)

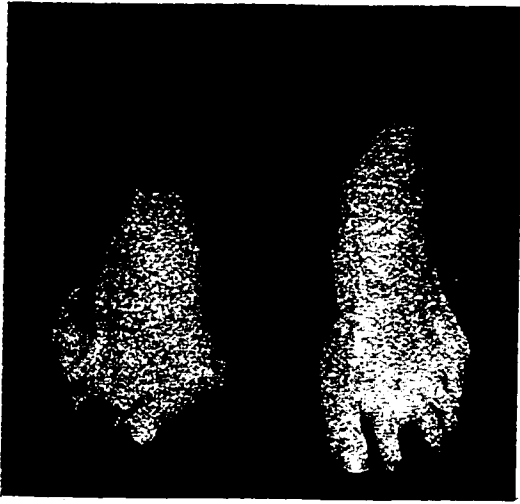


Figure B. Bunions
(<http://www.bodysync.net/bunions.htm>)



Figure C. Hammertoes with corns
(www.dr4feet.com/hammertoes.html)

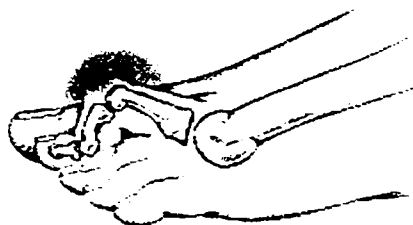


Figure D. Hammertoes
(www.foothealthnetwork.com/html/hammer_toe.html)

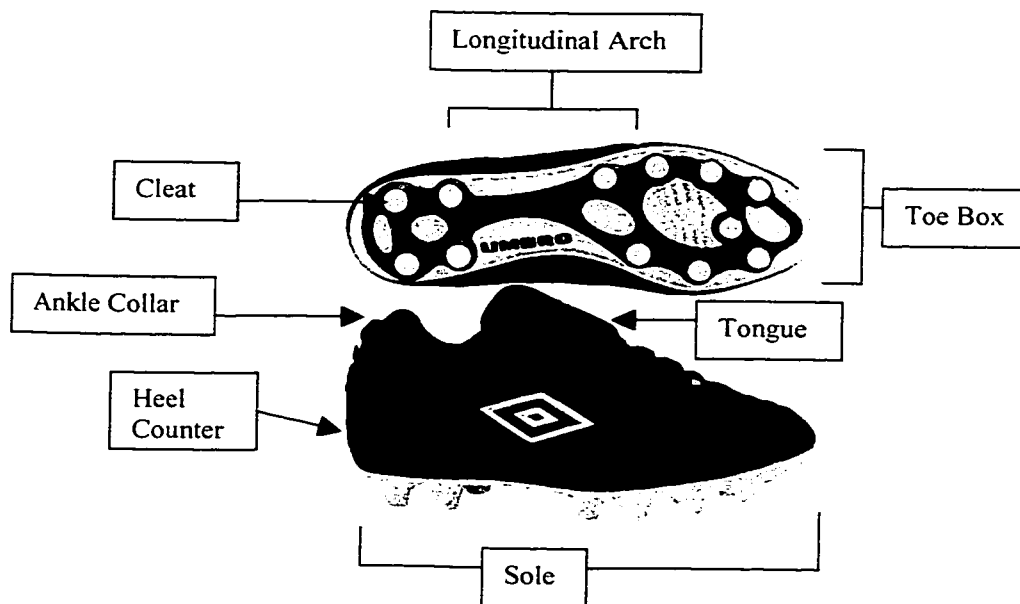


Figure E. Shoe Diagram
(www.livesoccer.com/um-9523.html)

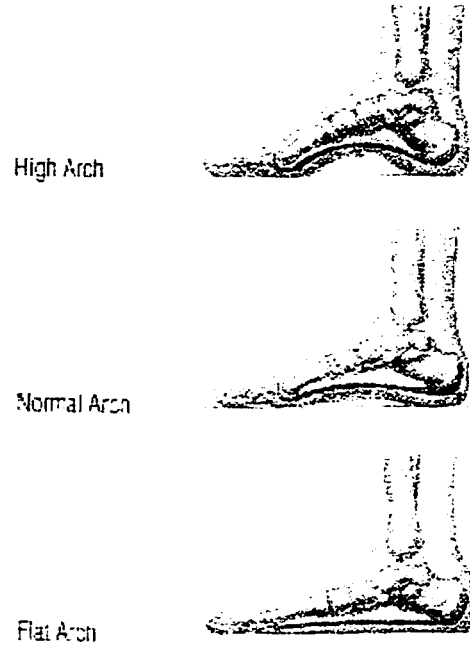


Figure F. Arch Types
(www.doctorfoot.com/diagrams.html)

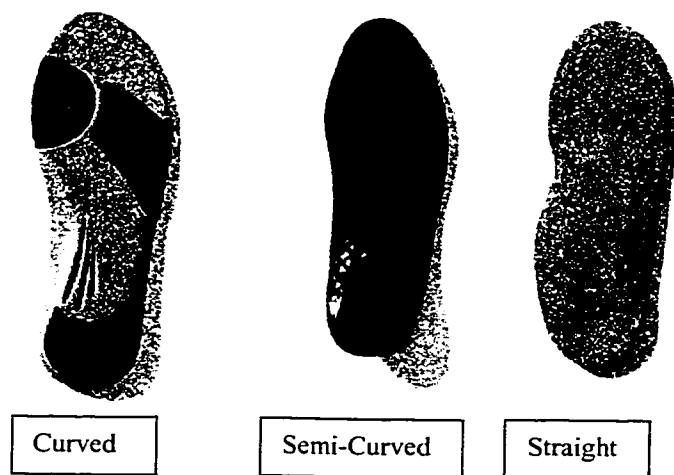


Figure G. Molds of shoes
(www.runnersworld.com/shoes/insole.html)

Table 1. How to Correct an Injury With Soccer Shoe Fit

BRANDS	APX TIME LOST	CAUSED BY	FIX BY
Ankle Sprains	4 weeks	Narrow heel	Wide Heel
Blisters	1 day	Small shoes	Larger shoe
Bunions Fig B	0 - Season	Narrow ToeBox	Wide Toe Box
Foot Sprains	2 wks-Season	Flexible Sole	Stiffer Sole
Hammertoes Fig D	0 - Season	Short Shoes	Longer Shoes
Ingrown Fig A Toenails	1 week	Small Toe Box	Larger ToeBox
Osteochondral Lesions	Season	Short Toe Box	½ inch past Toe
Shin Splints Tab 2	1-3 weeks	Improper Arch	Proper Arch
Stress Fx of foot	6-8 weeks	Flexible Arch Stiff Toe Box	Stiff Arch Flex Toe Box

Table 2. Arch Type

ARCH TYPE (FIG F)	SHOE MOLDS (FIG 7)	ARCH PADDING
High	Curved Mold	Soft Arch
Medium	Semi-Curved Mold	Holds Shape
Low	Straight Mold	Rigid Arch

Table 3. Characteristics of Selected Soccer Brands

BRAND	TOE BOX	HEEL WIDTH	ARCH HEIGHT	FOOT TYPE
Adidas Copa Mundial Preditor	Wide Wide	Wide Wide	High High	Wide, High Arch Wide, High Arch
Nike Zoom Air Tiempo	Narrow Narrow	Narrow Narrow	High High	Narr, High Arch Narr, High Arch
Kappa Viper TX Pro Player	Wide Wide	Wide Wide	Low Low	Wide, Low Arch Wide, Low Arch
Diadora Stadium Pro Euro RTX	Narrow Narrow	Wide Wide	Low Low	Narr Toes, Wide, Low Arch
Puma King MD	Narrow	Narrow	Low	Narr, Low Arch

Expanded Support Material

Chapter I

Introduction

Soccer shoes have been an integral part of play for many decades and yet athletes continue fitting soccer shoes improperly (Monkerud, 1977a). Improperly fitting soccer shoes can cause injuries that result in practice and game time loss that could be easily prevented (Sandrey, 1996).

Athletes have different foot shapes and therefore must purchase shoes that are custom fit (Janisse, 1992). Injuries such as fractures, ankle sprains, bunions, hammertoes, black toes, metatarsalgia, shin splints, and patellar femoral syndrome can be sustained due to improperly fitting shoes (Sandrey, 1996). A fracture can keep an athlete from participation for a minimum of six weeks, whereas an ankle sprain, depending on the severity, can debilitate an athlete from one to six weeks. Over time toe injuries like bunions and hammertoes can become permanent deformities causing continual difficulty with athletic activity. Metatarsalgia, shin splints and patellar femoral syndrome are all chronic injuries lasting for months and perhaps years, ultimately leading to time-loss injuries.

Differing foot types demand altered shoe fitting. For example, shoes that have narrow lasts should not be worn by athletes who have wide feet. This scenario causes injuries like hammertoes, ingrown toenails, plantar fasciitis, metatarsalgia, bunions and hallus valgus (Monkerud, 1977b). Coaches should understand foot differences and that soccer players need to be fitted with a shoe appropriate to their foot type (Janisse, 1992). Coaches should therefore understand how to fit a soccer shoe in order to aid athletes in the prevention of injuries.

With soccer shoe fitting knowledge, coaches can aid athletes in determining the proper shoe and decreasing the incidence of preventable foot injuries. In addition, a young soccer player taught how to properly fit a soccer shoe can then avoid certain time-loss injuries in the future. Athletes often seek advice from their coach pertaining to all aspects of their sport (Douge, 1993). Since coaches are an influential source of information for athletes (Douge, 1993), shoe fitting knowledge is necessary in order to relay these techniques and aid in decreasing time-loss injuries.

Injuries caused by improper shoe fit can affect the entire lower extremity. Johnson (1994) suggests that

improperly worn shoes cause pain in the foot, ankle, knee, hip and spine as a kinetic chain. Foot injuries such as fractures, sprains, bunions, hammertoes, black toes can be caused by improperly fitting shoes and further affect other lower extremity joints and perhaps gait (Ekstrand, 1983). Injury to this kinetic chain can eventually cause chronic injury or permanent disability, thus proper shoe fit is imperative.

Viitasalo (1983) indicates that most overuse injuries of the lower extremity can be corrected with proper shoe fit. For example, a shoe with a high arch can counteract excessive ankle motions and prevent shin splints from occurring (Viitasalo, 1983). Evidence of this information reaching the athletes from coaches has yet to be determined. Informing the athlete of proper shoe purchase may decrease injury. Since coaches are one of the most influential resources for athletes, they should have a good working knowledge of shoe fit to aid in injury prevention (Dodge, 1993).

This project intends to educate youth and high school soccer coaches on proper soccer shoe fit by writing and submitting an article for publication in Soccer Journal. The aim of the article is to aid in the prevention of

future injuries due to improperly fitting soccer shoes through the education of coaches.

Statement of the Problem

Time-loss injuries occurring from improper soccer shoe fit is preventable (Monkerud, 1977c). Coaches are important information sources for athletes and are most likely the athletes first resource (Douge, 1997). The extent of knowledge of coaches' on shoe fit is yet unknown. Thus, prevention of injury with proper shoe fit may be beneficial.

Statement of the Purpose

The purpose of this project is to educate high school and youth soccer coaches in the area of soccer shoe fit in order to aid in injury prevention by submitting an article for publication in Soccer Journal.

Delimitations

The article is directed to soccer coaches; therefore terminology will be catered to coaches' knowledge.

Limitations

- 1) The coaches' present level of knowledge regarding soccer shoe fit is unknown.
- 2) Coaches may not be the only population that can benefit from this information. Therefore the one angle approach

limits the population and overall effect of injury prevention through education.

3) Coaches may not take an active role in transferring knowledge to soccer athletes.

Assumptions

The assumption is made that coaches do not have the knowledge of how to properly fit a soccer shoe and they need to be educated. Therefore assumptions that coaches have not had formal training in soccer shoe fit is required. In addition, it is assumed that coaches will transfer the information about proper shoe fit to their athletes.

Definitions

Ankle Collar: A strip of padding around the top of the shoe at the ankle (Monkerud, 1977).

Brannock Measuring Device: A measuring device used in stores to fit shoes, measuring foot length, width, and arch length (Janisse, 1992).

Epiphyseal Plate: A bone's growth plate. The bone grows in length at this point (Anderson, 1995).

Hallux Valgus (Bunions): Swelling and prominence of the first metatarsal head associated with lateral shift of the great toe (Anderson, 1995).

Hammertoes: A flexion deformity of the toes characterized by extension of the metatarsal phalangeal joint, flexion of the proximal and distal phalangeal joints caused by short shoes (Anderson, 1995).

Last: The shape (mold) of the bottom of the shoe (Janisse, 1992).

Metatarsals: Long bones in the foot that lie between the toes and the tarsal bones, making the length of the foot (Anderson, 1995).

Metatarsalgia: A condition involving general discomfort around the metatarsal heads, caused by pressure around the metatarsal heads (Anderson, 1995).

Metatarsal-phalangeal Joint: The joint between the toes and the foot (Anderson, 1995).

Morton's Neuroma: A thickening of the plantar nerve between the 3rd and 4th metatarsal heads, causing pain and radiculopathy distally (Gallaspy, 1996).

Osteochondral lesion: Degeneration of the joint characterized by pain in the first metatarsal phalangeal joint caused by small shoes (Kinoshita, 1998).

Posterior Tibialis Tendonitis: Inflammation of the posterior tibialis tendon, causing pain on the medial side

of the lower third of the tibia during and after activity (Anderson, 1995).

Pronation: Combined motion of calcaneal eversion, foot abduction, and dorsiflexion (Anderson, 1995).

Shin Splints: Pain felt midway down the anterior lower leg during or following activity (Case, 1994).

Soccer Shoe Fit: The proper way a soccer shoe should be worn by an athlete in order to prevent injuries.

Subtalar: The joint between the talus and the calcaneus (Anderson, 1995).

Project Completion

Information on proper shoe fitting will be compiled into an article and submitted for publication in Soccer Journal.

Chapter II

Review of Literature

This chapter reviews available literature regarding proper soccer shoe fit and injuries that result from improperly fitting shoes. This chapter is divided into five areas: (1) shoe anatomy, (2) coaches' and athletes' knowledge, (3) injuries caused by improperly fitting shoes, (4) proper soccer shoe fit to prevent injury, and (5) shoe fit.

Shoe Anatomy

The anatomy of a soccer shoe consists of a toe box, tongue, heel, forefoot, sole, arch, and cleats (see Figure H). The toe box is the end of the shoe surrounding the toes. The tongue of a shoe functions as padding between the foot and the laces. The heel of shoe supports the heel of the foot. The middle of the shoe is considered the forefoot, consisting of the laces and the side panels. The sole is the part of the shoe that lies between the plantar surface of the foot and the ground. The arch of a shoe is located on the medial side of the shoe between the toe box and heel (Monkerud, 1977a). This information is important to know in order to properly fit a soccer shoe.

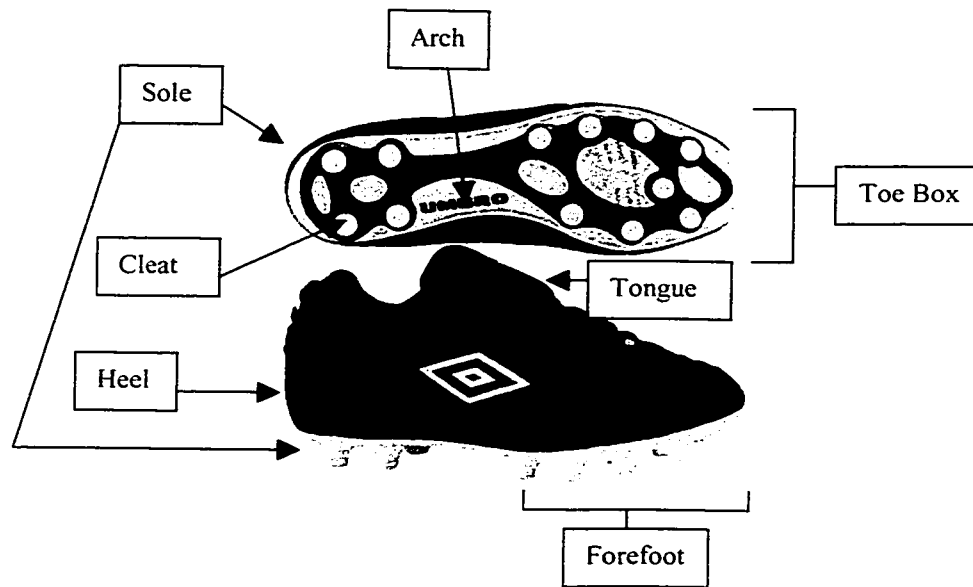


Figure H. Parts of Soccer Shoe
 (www.livesoccer.com/um-9523.html)

Coaches and Athletes Knowledge

Information regarding coach or athlete knowledge on properly fitting a soccer shoe has not been researched. Research has been published on how to properly fit a soccer shoe (Monkured, 1977b); however, information on the intended audience's knowledge is absent from the literature. Therefore the intention of this project is to inform, clarify, and/or reaffirm soccer shoe fit within the coaching audience.

Injuries Caused by Improperly Fitting Soccer Shoes

Injuries that can be caused by improperly fitting soccer shoes include shin splint, ankle sprains, and lower limb deformities. Viitasalo (1983) conducted a study indicating that individuals with shin splints have greater subtalar joint movement, meaning that people with shin splints have greater foot pronation (see Figure I). When a shoe supports the foot on the medial side of the foot, pronation does not occur and the likelihood of shin splints decreases (Case, 1994); thus purchasing shoes with more medial support to prevent pronation can combat shin splints. Wichmann's (1993) and Viitasalo's (1983) research indicates that greater medial support benefits individuals who over pronate or have flat feet (pes planus). Martin (1997a) suggests shoes with increased shock absorption can also decrease shin splints. By decreasing impact with more shoe cushion, muscles are placed under less stress during foot contact.



Figure I. Pronation
(www.people.virginia.edu/~kkr2b/web_class/project/biomechanics.html#pronation)

Movement in the midfoot can cause shin splints and ankle sprains along with foot sprains. Kitaoka (1995) demonstrated that four joints of the midfoot navicular-talus joint, metatarsal-navicular, talar-tibial, and calcaneal-talar move in relation to each other (see Figure J). The navicular-talus joint has the greatest amount of rotation during foot plant and pronation. The navicular bone is located on the medial side of the foot. If the navicular bone moves in foot plant and pronation then the arch falls, causing excessive pronation. Most rotation occurs when the foot is in pronation (see Figure I). Thus a

person who pronates should have good medial support in their shoe.

Kitaoka (1995) identified the hindfoot joints as stiff and the midfoot joints as flexible. Due to this flexibility the midfoot joints are more likely to move and be sprained in individuals who pronate. According to Viitasalo (1983) lower leg injuries such as ankle sprains can be associated with the shoe type. Wichmann (1993) explains this phenomena by advising athletes to buy a shoe with a broad heel on the outside to prevent the shoe from rolling and causing ankle sprains.

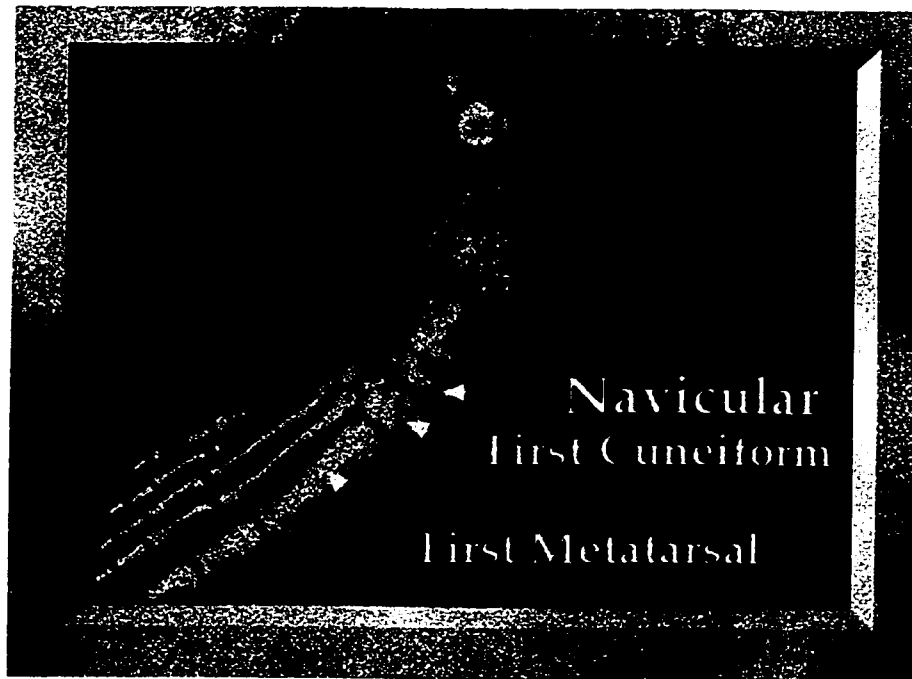


Figure J. Midfoot Joints
(www.csuchico.edu/jphed/atc/foot/3-disomedial.jpg)

In addition to acute injuries, improperly fitting shoes can cause minor injuries in the feet that can eventually lead to permanent deformities. Women have been wearing small shoes and incurring injuries for decades (Frey, 1993). These injuries show that small shoes have a negative affect on feet. Frey conducted a study on working women and the occurrence of injuries from wearing small shoes. Eighty percent of these women had foot pain, mostly in the toes, and 76% had one or more foot deformities. Eighty-eight percent of women wore shoes that were too small for their feet. Some of the deformities identified were hammertoes, hallux valgus, bunionettes, and corns. These are permanent deformities correctable only by surgical intervention. These deformities also occur in athletic shoes that are too small.

Wichmann (1993) states that different shoe design features can cause many injuries. For example, plastic tabs for laces have caused injury to the top of the foot. The tabs dig into the foot causing a bruise, which results in time-loss injuries. Stitching that holds on the logo can cause recurring blisters, indicating that the smallest alterations can cause injury to feet. Because soccer players depend on their feet to perform, properly fitting

shoes are warranted in order to play effectively. Wichmann suggests staying with the shoe that has been effective in the past, paying particular attention to shoe size.

According to Monkerud (1977b), soccer players are notorious for wearing soccer shoes that are too small. This has been a tradition due to the belief that if the shoe is tight as a sock then they have better control of the ball. These beliefs have contributed to the foot injuries of many soccer players. However, increasing a players shoe size can prevent these injuries (Monkerud 1977b).

Small shoes contribute to repeated contact of the big toe with the shoe, which causes osteochondral lesions. This can also be caused by a soccer shoe with a narrow soft toe box (Kinoshita, 1998). This case study was conducted indicating that degeneration of the toe joint could be caused from repeated pounding incurred from kicking a soccer ball with little protection in the toe box. Kicking with the big toe and repeated running can cause this injury. Any type of force or pressure in the toe area can cause pain and injury. A soccer player with an injury to the big toe will not be able to run, kick or play soccer. This case study showed that small shoes can cause injuries, but not all studies support this idea.

One research article expressed the opposite opinion that shoes do not help prevent overuse injuries. Finestone (1992) found that among infantry recruits the shoe fit did not change the number of overuse injuries. The foot length, width and arch height was measured. From that information an experimental group was issued a shoe that fit length and width. The control group received normal infantry boots that come in only one width size. The control group either had too wide or too narrow of a shoe. The study found no statistical significance in the number of injuries for each group. One possible reason for the differing outcome is that the infantry recruits generally exercise excessively and therefore regardless of shoe type these recruits can receive overuse injuries. In addition this study did not assess acute injuries caused by shoes, which can also be debilitating. Due to the difference between infantry boots and soccer shoes little correlation can be made.

There are many injuries that can occur due to improperly fitting soccer shoes. A poorly fitting shoe can cause a simple injury, like a blister, to a traumatic injury like an ankle sprain. Following suggestions for choosing the appropriate fitting shoe will decrease preventable soccer injuries.

Proper Soccer Shoe Fit to Prevent Injury

Sandrey (1996) suggests that a foot should be measured five different ways to properly fit a shoe: length of the foot, the length of the first metatarsal, fifth metatarsal, metatarsal width, and heel width. If all of these measurements are used for shoe fit then most overuse injuries can be avoided.

To properly fit a soccer shoe, the toe box, heel, last, sole, and arch must be adjusted (see Figure H). The toe box must be fitted properly in order to prevent toe injuries. All toes should fit in the toe box in width and length or bunions, hammertoes, hallux varus, jammed toes, and ingrown toenails will occur. While standing, toes should not touch the end of the shoe and should not be squeezed together. Wichmann (1993) advises buying a shoe with a broad heel on the outside to prevent the shoe from rolling over and causing ankle sprains. The last of the shoe should match the shape of the foot. If it does not injury to the arch, like plantar fasciitis or pronation will occur. If a flat foot is fit with a thin last then the arch of the foot will not have proper support and the arch will hang over the edge of the last. A flat foot necessitates a wide arch and broad last, and a high arched

foot requires the purchase of a high arched shoe with a thin last.

The shoe sole should bend where the foot naturally bends, at the metatarsal-phalangeal joint, to avoid plantar fasciitis. If the arch of the shoe bends at the midfoot then metatarsal injuries occur such as metatarsalgia (Janisse, 1992; Monkerud, 1977b, 1997a). When the sole is too flexible excessive pronation occurs which predisposes athletes to ankle sprains. Shoes with more medial support to prevent inward roll can combat shin splints. If the shoe supports the foot then pronation will not occur and the likelihood of shin splints decreases (Viitasalo, 1983).

Shoe Fit

There are a few key issues to consider when selecting the best fitting soccer shoe. The foot should always be measured first (Johnson, 1994). A Brannock measuring device should be used to measure foot length and width (Janisse, 1992). The length should be measured from heel end to the tip of the longest toe. Foot width should be measured at the metatarsal-phalangeal joint (see Figure L). A narrow shoe causes pain in the ball of the foot from the metatarsal heads being squeezed together. In addition, one foot is usually longer than the other, therefore it is

important to measure both feet and try-on both shoes (Martin, 1997a). If the longer foot is not measured, the small toe box may not fit, causing injury. According to Berling (1988) and Sandrey (1996), measuring the foot instead of buying a size previously thought to fit the foot is important since different brand names size shoes differently. Sandrey (1996) and Frey (1993) found that foot length and width changes with weight bearing and walking, therefore it is important to try the shoe on while standing. Length and width are some of the components of purchasing a soccer shoe. Other components include flexibility, last shape, and arch size.

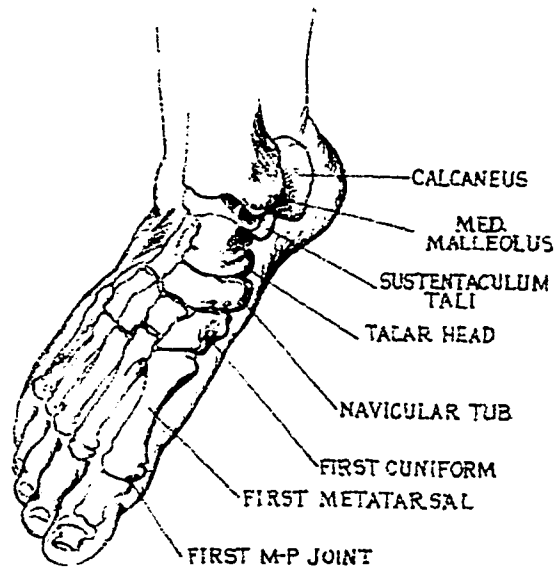


Figure K. Metatarsal Phalangeal Joint
(www.csuchico.edu/phed/atc/footAnat.jpg)

The forefoot of a soccer shoe should curve up when placed on a flat surface (Monkerud, 1977b) so that the toe does not jam or catch on the ground causing turf toe. Determining where the shoe bends is essential. The athlete should rise onto their toes and the sole should bend at the metatarsal-phalangeal joint. A shoe that bends in the arch instead of at the ball of the shoe should not be considered (Janisse, 1992; Monkerud, 1977b, 1997a), because it can cause plantar fasciitis, as well as pain in the metatarsal-phalangeal joint.

Adjusting shoe fit is another method of preventing injuries. The lip at the toe of the shoe should be minimal to prevent the foot from contacting the ground when shooting (see Figure H). Ankle sprains occur from this mechanism (Monkerud, 1977b). The sole of the soccer shoe should be rigid, but not too flexible. With the shoe on the table the sole should bend slightly with pressure from the palm of the hand, but not with two fingers (Johnson, 1994; Monkerud, 1977b). A sole that is too flexible leads to excessive pronation, tendonitis and sprained ankles. Flexibility can be tested by taking the heel and the toe of the shoe and twisting lengthwise. The correct amount of flexibility occurs when the shoe twists minimally. If the

shoe twists slightly, then it is the correct flexibility. If the shoe does not twist at all then it is too stiff. Toes can be injured if the shoe's sole is too flexible or stiff.

Toes are injured easily, therefore an athlete should be able to wiggle within the constraints of the toe box. All five toes should rest on the floor of the shoe (Monkerud, 1977b; Vogelsinger, 1984) and fit snugly with a thumb's width between the longest toe and the end of the shoe (Janisse, 1992; Martin, 1997a; Monkerud 1977a). Monkerud (1977b) states soccer players are known for wearing soccer shoes too small for their feet. If the toe box is too narrow then bunions and hallux valgus can occur and if the shoe is too long then the athlete can stub their toe or twist an ankle (Vogelsinger, 1984). A shoe that is too short causes hammer-toes, jammed toes and possible damage to the epiphyseal plates in adolescents stunting the toe's growth.

The shoe's tongue should have enough padding to protect the blood vessels and nerves on the top of the foot (see Figure H). Permanent damage to the foot via decreased sensation or function occurs when these vessels are damaged. The ankle collar should be high enough to support

the ankle joint, but low enough to avoid cutting into the ankle causing bruising to the ankle bones (Monkerud, 1977b). The achilles notch needs to be low enough to avoid the achilles tendon. In order to prevent irritation the achilles pad needs to cover the achilles tendon attachment at the calcaneus. The heel should be stable so the ankle does not invert. The heel counter should be one to one and a half inches high to provide enough support, and to keep the shoe on the foot since barefeet could get stepped on causing further injury. (Janisse, 1992; Monkerud, 1977b).

The placement of the cleats needs to be considered as part of shoe fit. Cleats should not be placed under the metatarsal-phalangeal joint, especially in children and adolescents, because continual pounding can cause damage to the epiphysial plate and stunt the toe's growth. If cleats are felt through the sole of the soccer shoe then bruising and even fracturing can occur from the pressure (Monkerud, 1977b). Along with ensuring proper shoe fit the last of a shoe must be congruent with the foot.

Different shoe brands use different style lasts, so it is important to know the styles used by each company (see Figure H). Nike tend to have a thin or curved last and Adidas tend to have a straight last. A high arch requires a

curved last, and a medium arch needs a semi-curved last. A low arch, or flat feet need a straight last. The best way to determine the type of arch is to make a footprint, if the middle of the foot is thin then it is a high arch, if the middle is very thick then it is a low arch (see Figure L). If a print is somewhere in between the two widths then it is a medium arch (Martin, 1997b). An individual's footprint should match the last shape of a shoe. The individual also needs to know their arch in order to choose the correct padding. A high arch needs a soft shoe arch to accommodate for the rigidity of the foot. A low arch requires a rigid shoe arch to add support to the foot's flexibility (Martin, 1997a; Wichmann, 1993).

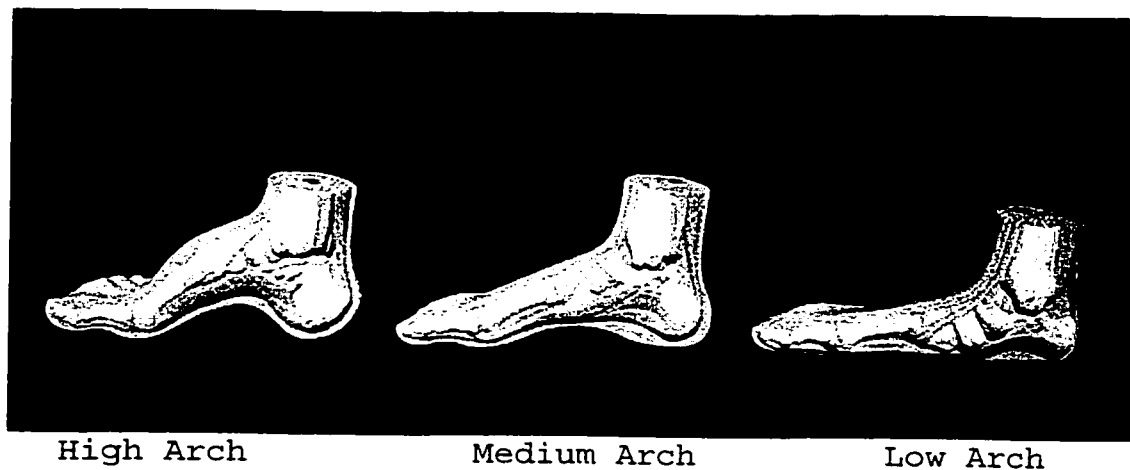


Figure L. Foot Types
(www.doctorfoot.com/diagrams.html)

Sandrey (1996) advises an excessive pronator to buy a shoe with a large amount of medial support. Excessive pronation can cause wear on the medial side of the shoe, leading to a decrease of rear-foot control and overuse injuries such as posterior tibialis tendonitis. In order to prevent posterior tibialis tendonitis and other injuries one should follow the advice of experts in pediatry and have extra medial support.

Adidas shoes have a wide toe box and Nike tend to have a slim toe box; therefore a person with a wide foot should purchase an Adidas soccer shoe. A narrow foot would fit better in a Nike soccer shoe in order to prevent sliding in the shoe. Nike soccer shoes have been known to take longer to break in the leather, which creates blisters.

Many suggestions on how to properly fit a soccer shoe have been noted including, trying on soccer shoes at the end of the day or after a practice when the foot is swollen will obtain a better fit (Frey, 1993; Martin, 1997a), and soaking the shoe in warm water and wearing them until they dry will form the leather to the individual's foot, creating a custom, comfortable fit (Vogelsinger, 1984). Vogelsinger also suggests tying laces loose for warm up and then before game time tighten the laces. This allows the

feet to swell during warm up and not decrease circulation. Martin (1997a) advises to try on shoes with game socks so the fit is the same on the field as in the store.

Summary

The majority of research on shoe fit states that injuries to the lower extremity could be prevented with a properly fitted shoe. Authors such as Kinoshita (1998), Kitaoka (1995), Sandrey (1996), and Viitasalo (1983) have researched injuries caused by improperly fitting shoes, researched how to properly fit a shoe, and showed that time-loss injuries are preventable. Martin (1997b) and Monkerud (1977a) have been at the forefront of setting guidelines for purchasing a soccer shoe. At this time little information is known regarding coach's knowledge of soccer shoe fit, however coaches have a strong influence on their athletes and therefore may be the best resource for this type of injury prevention. Athletes can learn from their coaches how to properly fit a soccer shoe and possibly aid in decreasing preventable injuries.

Chapter III

Procedures

This chapter will specify the procedures necessary in order to submit an article for publication for soccer coaches as the audience. This chapter describes the procedures used in the research for this article and is divided into three sections: (1) audience, (2) procedure, and (3) project completion.

Audience

Youth and high school soccer coaches are the targeted population in an attempt to aid in the prevention of time-loss injuries. Soccer coaches can significantly influence athletes, therefore information will most likely transfer from coach to athletes as opposed to other personnel involved with soccer teams (Barnett, 1992). Coaches will be able to teach their athletes proper shoe fit and potentially reduce injury rates from the information presented in the article created for submission.

Procedure

Article Selection

Several databases from San Jose State University's library and Stanford's Lane Medical library were used to research and write a journal article for soccer coaches.

The databases consisted of ERIC, Sportsmed, and Medline. Twenty-four articles were selected for review for this project. The criteria for selecting articles includes: information regarding shoe fit, injuries caused by improper shoe fit, coaches knowledge of shoe fit, and coaches influence on athletes. I originally found 32 articles, but only 25 fit my criteria. Seven articles that did not relate injuries to shoes were eliminated. Definitions from standard textbooks used in athletic training courses were also used to obtain information about injuries. Articles that examined the transference of information from coach to athlete were reviewed and those that pertained to coaches' influence on athletes were included.

Journal Selection

Journals appropriate for article submission were selected based on access to soccer coaches. Several options exist for publication. Soccer America was eliminated as a potential magazine because it targets soccer players not coaches. Soccer Journal was selected because it targets coaches as well as players. This journal reaches many youth and high school soccer coaches. The journal has 15,000 subscribers and 95% of them are coaches (Schum, T., personal communication, August 28, 2000).

Information from articles found in the databases were selected and placed on index cards. Once all articles were read and indexed, cards were grouped into similar categories. An outline of chapter two was then completed using the categories from the index cards. Information on coaches and athletes' knowledge were grouped together. Then information on the injuries that are caused by improperly fitting soccer shoes was combined. Information regarding soccer shoes was attained. The literature assimilated will be used to create the journal article.

Project Completion

Information on proper soccer shoe fit was compiled into an article and submitted for publication to Soccer Journal. Contact with the journal editor indicated no specified submission format (see Appendix A).

Summary

This article will target soccer coaches in an attempt to increase knowledge of soccer shoe fit. The primary audience is high school and youth soccer coaches. Information was obtained and combined in order to write the literature review. Information collected will be assimilated into a journal article for submission to Soccer Journal.

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<http://www.csuchico.edu/jphed/atc/foot/3disomedial.jpg> Viewed September 3, 2000 (Midfoot Joints).

<http://www.csuchico.edu/phed/atc/footAnat.jpg> Viewed September 3, 2000 (Metatarsal-Phalangeal Joint).

<http://www.doctorfoot.com/diagrams.html> Viewed on September 3, 2000 (Arch Types).

Appendix A
Authors Notes



Hard to keep track of those little yellow notes?

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Inbox Compose Address Book Folders Options Messenger Calendar Help

Folder: Inbox

From: tim schum <tschum@binghamton.edu> Save Address - Block Sender
To: "Shyla Penn" <pshyla_@hotmail.com> Save Address
Subject: Re: Publishing
Date: Tue, 20 Mar 2001 18:39:50 -500

Reply Reply All Forward Delete Previous Next Close

Shyla: I have been in Florida for most of the month and do recall a phone call that was a bit hazy on what you wanted. In any case, citations at the end please. The best bet is to attach it as a Word document to an email and at the same time send a hard copy to my address at Binghamton University. Don't rush as we have a raft of articles awaiting publication. Best - Tim S.
> Hello Tim Schum,
> I have tried to call you several times and it seems impossible to get ahold
> of you that way so I thought I would try an email. I am finishing up my
> thesis project for my masters and I just need some information from you. I
> am trying to get an article published in Soccer Journal and I need to know the
> proper format and citations that your Journal would like me to use. Do you
> want the citations within the text or do you just want a list of References
> at the end. If you have any information that could help me finish up this
> project that would be great. Thanks for your time.
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>
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